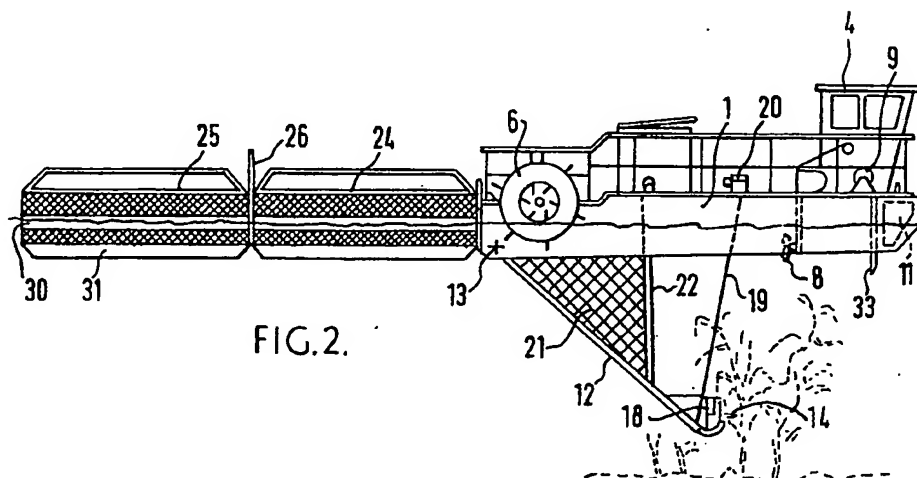


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(54) Gathering seaweed

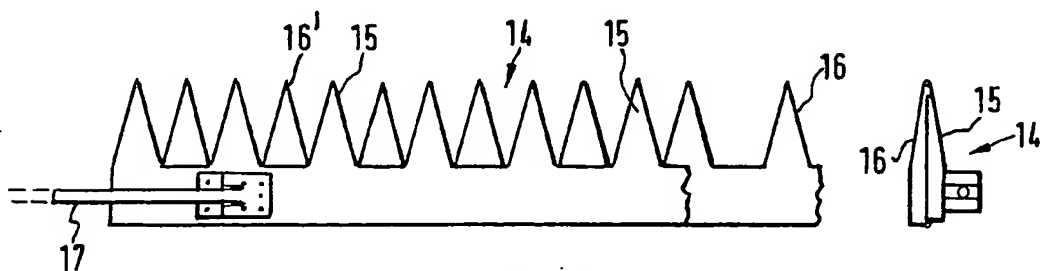
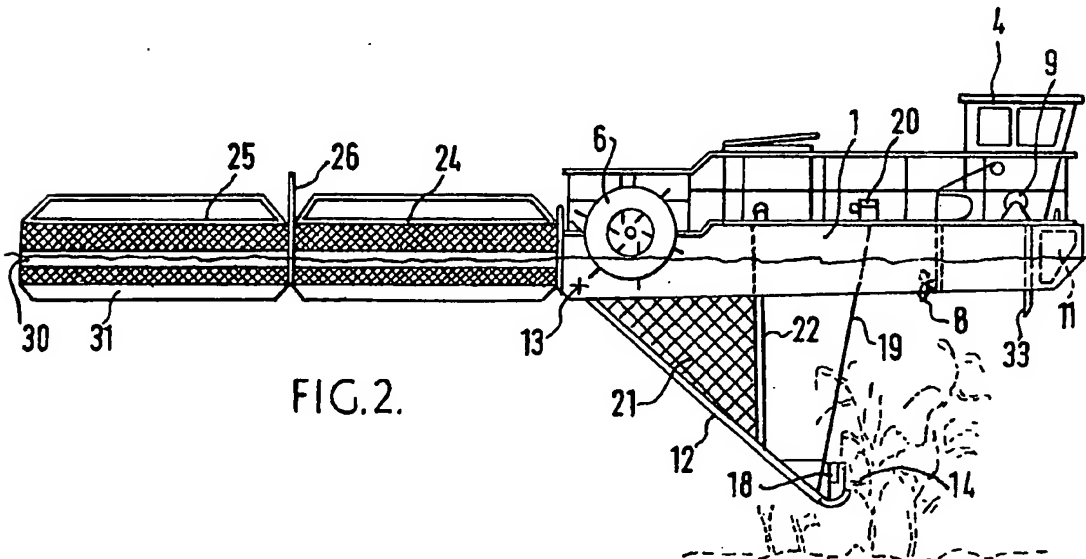
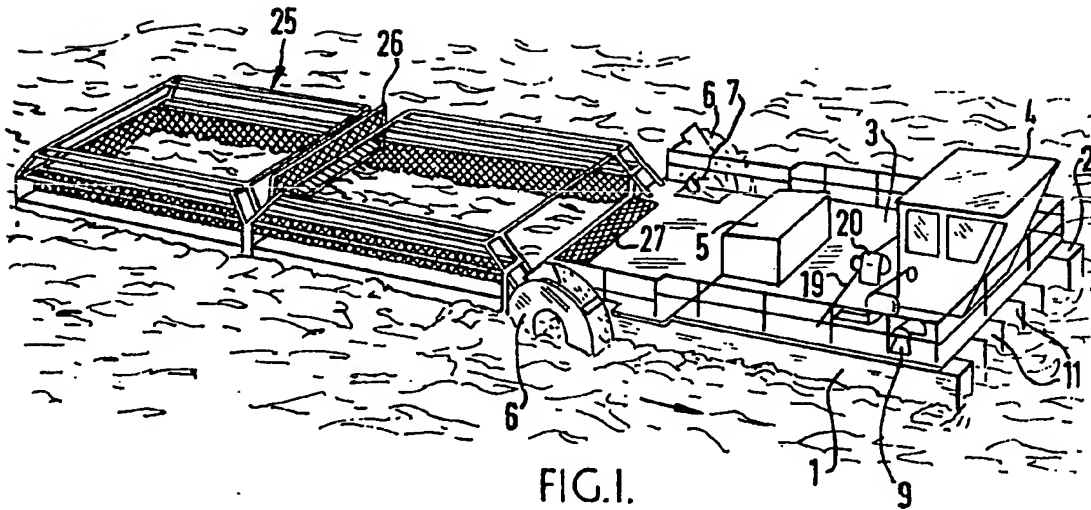
(57) A vessel for gathering seaweed or other aquatic vegetation, comprises a floating assembly driven by an engine or power plant 5. The assembly comprises two floats 1, 2 which carry a platform on which a control booth and the power plant are provided. A water tunnel is defined beneath the platform and between the floats 1, 2. Means, such as propellers 8, are provided for driving water rearwardly through the tunnel. Paddle wheels 6 propel and steer the vessel. Submerged cutting means 14 cut the vegetation which is collected by net 21 which communicates with a cage (23 or 24) for receiving the cut vegetation.

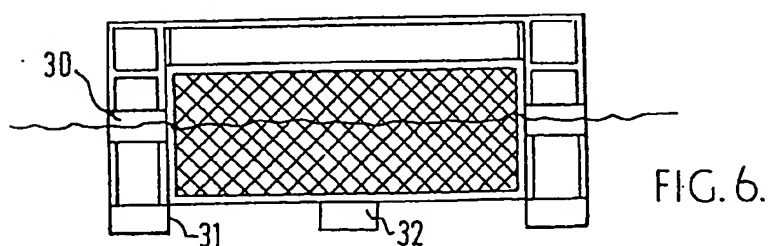
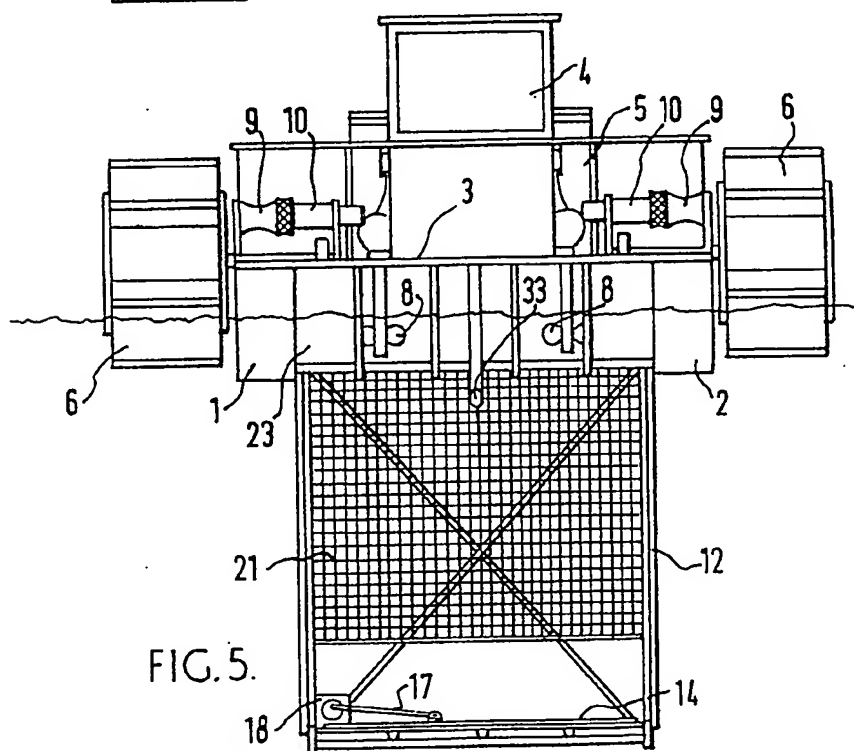
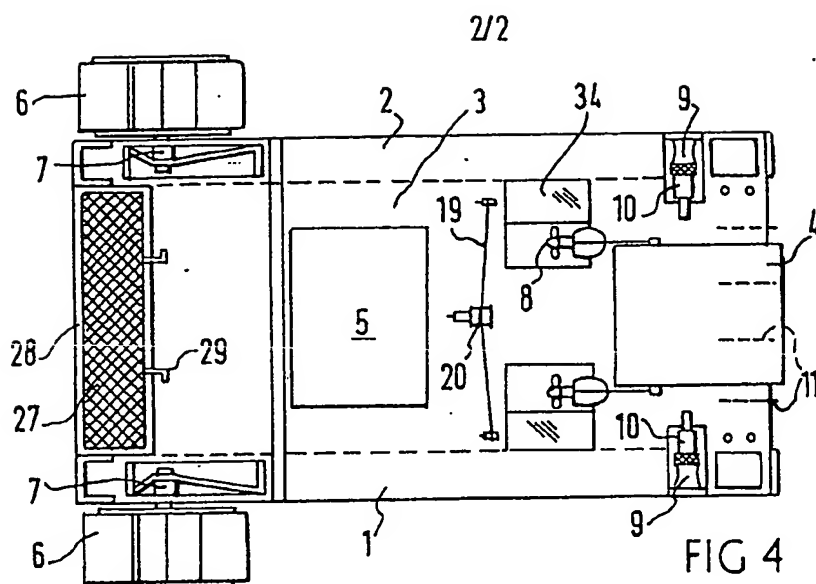


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SPECIFICATION

Vessel for gathering seaweed or other aquatic vegetation

5 Several types of vessels for gathering seaweed or other aquatic vegetation are known, particularly those used for collecting "macrocystis" and other types which can be subjected to mechanical cutting, due to several uses for different ends which are present are very much increased. Such vessels, comprise of conventional floating and motor driven units which may be driven by means of helixes (propellers), paddle wheels or helix-turbines, and include at their front means for cutting seaweed comprising toothed knives similar to those used in grass cutting machines, which are generally selectively located on different immersion levels, but to limited depths. Following such cutting element, such assemblies have means for rearwardly displacing and lifting the cut vegetation in order to deposit it on deck wherein they are exposed to weather conditions, employing for this end different receiving means which vary according to the different embodiments available, but which have always the same operative characteristics, which require further handling to withdraw the cut vegetation from the deck in order to transfer it to special containers or to other vessels.

The known floating tendency of the plants thus cut, makes it possible that they vertically ascent to be received by a transport-lifting unit which moves them to the deck, said displacement means being essential for transferring the cut seaweed from the water level to the level of the deck or the cut seaweed from the water level to the level of the deck or the hold. Of course, the incorporation of mechanisms for the functioning of said transport-lifting means involves a plurality of maintenance requirements and a high power consumption, with a corresponding yield limitation.

The invention provides a vessel for gathering seaweed and the like, which is characterized by its high effectiveness and by a higher yield of the power needed for its operation, in what concerns to the gathering means *per se*, as well as to the means used in the conditioning of the crop material, as well as to the operation of the driving means.

More precisely, the invention provides a vessel of the above-mentioned type which, apart from the above-mentioned advantages, gives basic improvements in regard to maintenance, repair and replacement requirements, since it includes, as compared with the known vessels for gathering seaweed and the like, a substantial reduction of functional elements in order to carry out cutting, lifting, inner transport operations and conditioning of considerable volumes of product for further transport in containers to processing plants. Besides, the vessel needs less labour for its operation.

The vessel of the instant invention takes advantage of an arrangement of its driving and floating means different to that of the prior art, providing a

driven water tunnel, the steam of which is added to the stream from the advance of the vessel in order to rearwardly displace the cut branches, before they reach the water level, that is, while they are immersed, for transferring them without any transport unit, to special receiving cages removably located behind the vessel, said cages being semi-submerged so that the branches remain under said water level, and therefore, under better preserving conditions.

For such end, the vessel of this invention comprises two parallel, or substantially parallel shells, one by the other, having the particularity that, on said shells or elongate floats, there is a platform, thus a tunnel being constituted limited at the sides by said floats and limited in its upper part by said platform. On the platform a power plant and a command booth are located, and under said platform and in the front part of the tunnel, there are one or more helixes, or the like, capable of driving the vessel from the front part; while, from the rear part of the tunnel, means retaining the cutting element descend in a regular form, along with the eventual driving motor, which will be preferably a hydraulic motor since it will have to operate submerged.

The means retaining the cutting element include swivelling side bars which, simultaneously, hold a net which direct the cut branches rearwardly and upwardly, and which does not reach in its rear end to the floating level on to the level of the outer water. At its rear end, the net defines an ample rear opening through which the branches may pass without any inconvenience to said semi-immersed receiving cages which are located in tandem behind the vessel. The passage of the branches towards the cages is improved by the tunnel stream formed by the sum of the advance displacement of the vessel and the flow produced by the helix or helices.

The sum of streams makes the branches naturally ascend to the collecting net following the cutting element. That is to say, the special front disposition of the helices and the tunnel, contributes to a displacement without power consumption of the branches towards the receiving cages after passing through the net.

Besides, in correspondence with the rear end of the net, there is a removable gate, for example a wire net, capable of closing the opening defined on said end, before entering the cages. Said gate is provided for storing branches even without the addition of cages, or when said cages have been withdrawn by any reason. The storage will be carried out into the net and, when a cage is located behind the vessel, the branches retained therein will pass by means of the stream flow to the rear bottom of the cage merely by opening the gate.

The net is preferably held by two swivelling arms pivoting about respective pivot pins located in the inner faces of the two floats and on the rear part of the floats, said pins being below the water line of the vessel.

The above-described arrangement, particularly

The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

due to the front location of the helices or the like, permits greater cut depths, being the cutting depths of four times the depth attained with the vessels known up to now, thus increasing the collecting

5 yield all these advantages being also attained with a reduction in the power consumption, since the lifting and inner transport means are eliminated.

Among the complementary elements of this vessel there are resources for locating the driving helix or helices to selected levels, as well as those permitting the location of the cutting elements in different depths, and all means needed to direct the vessel which will be preferably paddle wheel driven by reverse motors located outside the elongate floats

10 and on the rear portion. With such paddle wheels, and besides the driving effect, the facilities of braking and steering the vessel are provided.

The vessel may be further provided with other functional apparatus or accessories.

20 A vessel embodying the invention is described below by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view of the vessel;

Figure 2 is a side view of the vessel;

25 Figure 3 is a two blade toothed knife used as cutting means and located at a selected level under the vessel;

Figure 4 is a schematic plan view of the vessel;

30 Figure 5 is a vertical transverse cross-sectional view of the vessel; and

Figure 6 is a vertical transverse cross-sectional view of one of the cages towed by the vessel.

In the drawings, like reference numerals denote like parts.

35 Referring to the drawings, the vessel shown therein comprises two elongate floats 1 and 2 which carry a substantially horizontal platform 3, on which a control or command booth 4 and a power plant 5 are located. The power plant 5 may be provided with

40 an internal combustion engine coupled to a hydraulic pump capable of providing liquid under pressure in order to drive engine or motor means referred to herein. On both sides of the float there are

45 paddle wheels 6 selectively usable as braking means, direction-controlling (steering) means and driving means. In order to attain this, each of the paddle wheels 6 is coupled to a respective engine, preferably a hydraulic motor 7, as shown in Figure 4.

A water tunnel is defined between the floats 1 and 50 2 and beneath the platform 3. Propellers (helices) 8 are provided in a front portion of the tunnel. The propellers 8 serve to drive water rearwardly through the tunnel and also assist in propelling the vessel through the water.

55 Under the platform 3 and at the front of the vessel, between the floats 1 and 2, there are a plurality of vertical and parallel plates 11, the height of which is equal to that of the floats 1 and 2. The plates constitute means for rectifying water streams during

60 advance, and also constitute a means for protecting helices (propellers) 8 against sand bars, stones, logs, and other obstructions since said helices 8 are located at a depth preferably less than that of the draft of the floats 1 and 2. The helices 8, which are

65 replaceable by paddle wheels or other similar

means, as turbine helices, are fixable at selected depths by means of hoisting engines or blocks, specially for raising them when the vessel is towed to be located on a shore. The raising of the helices (propellers) 8 can be carried out by side winches 9 coupled to corresponding engine means 10.

A swivelling frame 12 pivoting in the rear part 13 of the tunnel formed between the two floats and the horizontal platform, holds a cutting device 14 formed by two toothed knives 15 and 16 as shown in Figure 75 3. One of the knives is fixed in the frame 12, while the other is reciprocally displaceable by means of a connecting rod-crank system 17 driven by a motor 18, which is preferably hydraulic. The frame 12 and the cutting device 14 constitute an assembly, which

80 hangs from cables 19 extending on the platform 3 from a block 20. By means of the block 20 and the cables 19, the frame can be held at a desired depth (and at a desired slope). The frame 12 holds a net 21 of appropriate metallic mesh, which is open at its

85 front 22 and at its rear. The rear of the net 21 is of less height than the front of the net and defines an opening 23.

Seaweed strands or branches which are cut by the 90 knives 15 and 16 are pushed by the stream of water produced by the advance of the vessel and by the propellers 8 to the rear part of the net 21 and then pass through the opening 23 and enter cages 24 and 25 towed by the vessel. The opening 23 is wide

95 enough to allow the cut seaweed to pass easily or freely therethrough.

The cages 24 and 25 are separated by a mesh gate 26 which closes when the rear cage 25 is completely full, in order that further entering branches are deposited in the leading cage 24. Another gate 27 100 pivoting on a shaft 28 and fixable by means of pins 29, is located mating with the rear opening 23 of the net 21, behind the floats 1 and 2. The gate 27 prevents the seaweed branches from coming out of the

105 net 21 when the cages are withdrawn.

The shaft 28, on which the gate 27 pivots, is above the water level and extends along the upper edge of the gate. When the gate 27 closes the rear opening of the net 21, the lower edge of the gate coincides with 110 the lower horizontal edge of the opening.

Each of the cages 24 and 25 has walls and floor of a mesh size sufficient for retaining the cut seaweed, according to the species being gathered. Each cage 24 or 25 comprises rigid frames connected to side 115 floats 30 and an intermediate lower and central float 32, as shown in Figure 6.

A telescopic (periscopic) sight 33 is located between the floats 1 and 2 adjacent the front of the vessel, in order to provide observation of the movement of the cut branches or other immersed elements. This is an optional accessory.

On the platform 3 openings may be provided for maintenance and other purposes in connection with the submerged elements. Some of the openings, 125 such as those indicated by reference numeral 34, may be provided with removable covers.

This construction of the vessel of the invention, when same is used for gathering seaweeds or the like, the composition of the movements resulting 130 from the advance, and the helices driving force and

the tendency to float of the branches, makes it possible that the branches direct immediately towards the collecting net 21, as may be seen in Figure 2, and from the net continue their way to the tandem coupled trailing cages 23 and 24 without the need of transport means.

CLAIMS

1. A vessel for gathering seaweed or other aquatic vegetation, comprising a floating engine-driven assembly, said assembly having two side floats, a platform held by the floats and provided with control means and power means, a water tunnel being defined beneath the platform and between the floats, means in the front portion of the tunnel for driving water rearwardly through the tunnel, means for propelling and steering the vessel, submerged vegetation cutting means disposed behind the water-driving means and at a lower level than the water-driving means, a net behind the cutting means, a lower portion of the net sloping upwardly and rearwardly, the net being for gathering vegetation cut by the cutting means, the net being open rearwardly and communicating with a cage for receiving the cut vegetation.

2. A vessel as claimed in Claim 1, wherein said net is held by two arms pivotal about an axis below the water line of the vessel.

3. A vessel as claimed in Claim 2, wherein the two arms also carry the means for cutting vegetation.

4. A vessel as claimed in any preceding Claim, wherein the cutting means comprises two relatively reciprocable knives having forwardly-directed teeth.

5. A vessel as claimed in Claim 3, wherein the lower ends of the arms which hold the net and the cutting element hang from a hoisting mechanism capable of holding said arms fixed at a selected depth and with the lower portion of the net at a selected slope.

6. A vessel as claimed in any of Claims 1 to 4, wherein the water-driving means in the water tunnel are coupled to respective driving engines fixable in selective levels, preferably comprised between the water level and the bottom of the floats.

7. A vessel as claimed in Claim 6, wherein the engines to which the water-driving means are coupled are hung from respective cables extending on the platform up to corresponding manual blocks.

8. A vessel as claimed in any preceding claim, wherein a mesh gate is pivotal about an axis above the water level selectively to open and to close the rear of the net.

9. A vessel according to any preceding claim, wherein the cage is held semi-submerged and communicates below the water level with the net.

10. A vessel as claimed in Claim 9, wherein the cage comprises a structure in which side and bottom meshes are joined; said structure being engaged to said floats which maintain said mesh semi-

immersed, with said bottom mesh substantially coplanar with the lower edge of the rear opening of the net.

11. A vessel as claimed in Claim 9, wherein the cage has at its front and rear gates for selectively opening and closing the cage at its front and rear.

12. A vessel according to Claim 11, wherein the gates are of metallic mesh.

13. A vessel according to any of Claims 9 to 12, comprising a further cage, for communicating with the net, each cage has at its front end means for releasable engaging the cage with said floating assembly, the cages being capable of tandem coupling.

14. A vessel according to Claim 1, substantially as described herein with reference to the accompanying drawings.

15. A vessel for gathering seaweed and the like, of the type constituted by a floating and engine driven assembly, including immersed means for cutting branches of said vegetables and means for gathering, raising and transferring rearwardly said branches, characterized in that said floating assembly is constituted by two side and elongated floaters which hold an upper platform containing the command booth and a power plant, under said platform there being defined a water tunnel, the water of which is driven backwards by helixes located in said tunnel in its front part; said helixes, in combination with blade wheels at the sides of the floaters, or the like, with driving forces independent and in selective directions, being the driving means of the assembly; the cutting element being located behind said first helixes and at a lower level, there being behind said cutting element a branch gathering net having its bottom formed by an inclined plane ascendent rearwardly, in which said net is open and communicating with a cage receiving said branches; said net and the tunnel forming the cited means for gathering, raising and transferring the branches backwards.

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